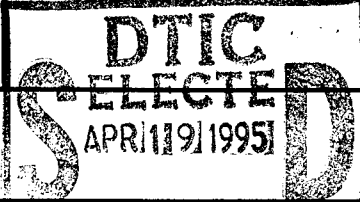
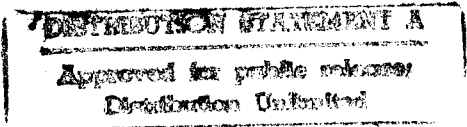


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**ANNUAL REPORT No. 1**  
**February 1, 1994 - January 31, 1995**

**Cloud Condensation Nuclei Measurements in Shiptrails**  
**(Grant N00014-94-1-0339)**

**Submitted to**  
**Office of Naval Research**

**by**

**James Hudson**  
**Principal Investigator**

During this first year the primary focus was on the field project in June. To this end the CCN calibration equipment, including the 3010 CN counter, along with the volatility apparatus were mounted in a new rack for easy installation and operation. During April the investigator attended the planning meeting in Monterey and brought the equipment--two racks--to Seattle for installation on the University of Washington C-131 aircraft. The equipment was there for one week during which three test flights were made. The DRI equipment operated without problems on these flights.

At the end of May the same equipment was transported to Monterey to again be mounted on the C-131 for the field project. The equipment operated successfully for most of the time on 11 of the 12 research flights. For most of the time the CCN spectrometer directly monitored the ambient CCN spectrum. Occasionally, usually at least once per flight, the sample aerosol was heated to high temperatures in a processing tube. This yielded information about the volatility of the particles, which can be used for indirect chemical identification of the particles. Also on some of the flights the aerosol was size classified before entering the CCN spectrometer. This allowed the size of the CCN to be

determined, which yields information about the relative solubility of the CCN. This is another indirect determination of particle composition. During some of the in-cloud passes the CCN spectrometer monitored the residue from the cloud droplets. This intercomparison with the counterflow virtual impactor (CVI) of the University of Rhode Island allows a precise determination of the CCN that are actually within the cloud droplets. When this is compared with the ambient CCN and the cloud droplet distribution important clues about cloud dynamics can be obtained.

During and since the project the total CCN concentrations and the total particle concentrations have been plotted as a function of time and pressure altitude--for the soundings. The calibrations have been plotted in order to derive the complete CCN spectrum from the data. Analysis of the data is ongoing.

There were very high CCN concentrations within most of the ship plumes that were penetrated. This was highly variable depending on the distance from the ship, ambient conditions, and probably the ship power plant--operating conditions and fuel. Higher concentrations were also found within the shiptrail clouds compared with ambient clouds.

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